

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY (Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

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| Applicant's or agent's file reference PCT836 | FOR FURTHER ACTION | | See item 4 below |
| International application No. PCT/JP2005/003449 | International filing date (<i>day/month/year</i>) 02 March 2005 (02.03.2005) | Priority date (<i>day/month/year</i>) 02 March 2004 (02.03.2004) | |
| International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237 | | | |
| Applicant THE CHUGOKU ELECTRIC POWER CO., INC. | | | |

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.

3. This report contains indications relating to the following items:

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|-------------------------------------|---------------------|---|
| <input checked="" type="checkbox"/> | Box No. I | Basis of the report |
| <input type="checkbox"/> | Box No. II | Priority |
| <input type="checkbox"/> | Box No. III | Non-establishment of opinion with regard to novelty, inventive step and industrial applicability |
| <input checked="" type="checkbox"/> | Box No. IV | Lack of unity of invention |
| <input checked="" type="checkbox"/> | Box No. V | Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
| <input type="checkbox"/> | Box No. VI | Certain documents cited |
| <input type="checkbox"/> | Box No. VII | Certain defects in the international application |
| <input checked="" type="checkbox"/> | Box No. VIII | Certain observations on the international application |

4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

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| Date of issuance of this report 29 November 2006 (29.11.2006) |
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Form PCT/IB/373 (January 2004)

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

PCT
TRANSLATION

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

(PCT Rule 43bis.1)

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|---|---|---|
| | | Date of mailing (day/month/year) |
| Applicant's or agent's file reference PCT836 | | FOR FURTHER ACTION See paragraph 2 below |
| International application No. PCT/JP2005/003449 | International filing date (day/month/year) 02.03.2005 | Priority date (day/month/year) 02.03.2004 |
| International Patent Classification (IPC) or both national classification and IPC | | |
| Applicant THE CHUGOKU ELECTRIC POWER CO., INC. | | |

1. This opinion contains indications relating to the following items:

- Box No. I Basis of the opinion
- Box No. II Priority
- Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- Box No. IV Lack of unity of invention
- Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- Box No. VI Certain documents cited
- Box No. VII Certain defects in the international application
- Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

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| Name and mailing address of the ISA/JP | Authorized officer |
| Facsimile No. | Telephone No. |

WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY

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PCT/JP2005/003449

Box No. I Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

This opinion has been established on the basis of a translation from the original language into the following language _____, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).

2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

a. type of material

a sequence listing
 table(s) related to the sequence listing

b. format of material

in written format
 in computer readable form

c. time of filing/furnishing

contained in the international application as filed.
 filed together with the international application in computer readable form.
 furnished subsequently to this Authority for the purposes of search.

3. In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

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Box No. IV Lack of unity of invention

1. In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
 paid additional fees
 paid additional fees under protest
 not paid additional fees
2. This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is:
 complied with
 not complied with for the following reasons:

The subject matters of claims 1-45 relate to a method for treating exhaust gas, in which exhaust gas is distributed to a cooling medium to cool the gas to a first temperature at which carbon dioxide is not solidified but a nitrogen oxide is liquefied or solidified, thereby separating the nitrogen oxide, and subsequently, carbon dioxide is separated by cooling the resultant exhaust gas to a second temperature at which carbon dioxide is solidified.

Meanwhile the subject matters of claims 45-53 relate to a method for separating carbon dioxide, in which (1) gas containing carbon dioxide is distributed in a pressure-proof container to cool and solidify the carbon dioxide, (2) the pressure-proof container is sealed, (3) the carbon dioxide is liquefied due to a pressure caused by vaporization of the carbon dioxide by increasing the temperature of the solidified carbon dioxide, and (4) the liquefied carbon dioxide is discharged from the pressure-proof container.

Both of the subject matters of claims 1-45 and the subject matters of claims 45-53 relate to a technique in which carbon dioxide is separated by solidifying, however the technique is a well-known technique without the necessity of exemplification, so it is not a special technical feature in the sense of PCT Rule 13.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
 all parts
 the parts relating to claims Nos. _____

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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| International application No. |
| PCT/JP2005/003449 |

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| Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement | |
| 1. Statement | | |
| Novelty (N) | Claims <u>1-45</u> | YES |
| | Claims <u>46-53</u> | NO |
| Inventive step (IS) | Claims <u>5, 6, 14, 15, 21-23, 30-32, 38, 39, 42, 43</u> | YES |
| | Claims <u>1-4, 7-13, 16-20, 24-29, 33-37, 40, 41, 44-53</u> | NO |
| Industrial applicability (IA) | Claims <u>1-53</u> | YES |
| | Claims _____ | NO |
| 2. Citations and explanations: | | |
| Document 1: JP, 60-172334, A (Rikuzo YAMANO), 05 September, 1985 (05.09.85) | | |
| Document 2: JP, 4-77308, A (The Chugoku Electric Power Co., Inc.), 11 March, 1992 (11.03.92) | | |
| Document 3: JP, 1-115432, A (Juichi YAMAMOTO), 08 May, 1989 (08.05.89) | | |
| Document 4: FR, 2820052, A1 (ARMINES ASSOCIATION POUR LA RECHERCHE ET LE DEVELOPPEMENT DES METHODES ET PROCESSUS INDUSTRIELS), 02 August, 2002 (02.08.02) | | |
| <p>The subject matters of claims 1, 2, 7, 10, 11, and 16 do not appear to involve an inventive step in view of document 1 cited in the ISR and a well-known technique. Claims in document 1 describe that exhaust gas is cooled to a temperature below the condensing temperature of each component (water, a nitrogen oxide, a sulfur oxide, carbon dioxide and the like) to selectively separate the each component. Furthermore, since distributing gas to be treated through a cooling medium in a condensation treatment is recognized as a well-known technique without the necessity of exemplification, a person skilled in the art could have easily placed gas to be treated in direct contact with a cooling medium in the invention described in document 1.</p> | | |
| <p>The subject matters of claims 3, 4, 12, and 13 do not appear to involve an inventive step in view of document 1, document 2 cited in the ISR, and a well-known technique. Document 2 describes that only a cooling medium is vaporized and is used in circulation. Furthermore, both of documents 1 and 2 relate to a gas condensing treatment, so it is considered easy that, in the invention described in document 1, only the cooling medium is vaporized and the cooling medium is used in circulation as described in document 2.</p> | | |
| <p>The subject matters of claims 5, 6, 14, and 15 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.</p> | | |
| <p>The subject matters of claims 8 and 17 do not appear to involve an inventive step in view of document 1 and a well-known technique. Liquefying solid carbon dioxide is recognized as a well-known technique without the necessity of exemplification, and a person skilled in the art could have easily combined the invention described in document 1 with such a well-known technique.</p> | | |
| <p>The subject matters of claims 9 and 18 do not appear to involve an inventive step in view of document 1 and a well-known technique. It is recognized as a well-known technique that, in an exhaust gas treatment, removal of dust, moisture and harmful components is performed by previous spraying of water.</p> | | |
| <p>The subject matters of claims 19, 24-28, and 33-36 do not appear to involve an inventive</p> | | |

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

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| International application No. PCT/JP2005/003449 |
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| Box No. V | Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement |
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step in view of documents 1 and 2, and a well-known technique. Document 2 describes that gas to be treated is exhaust gas from an LNG burning boiler, and the cooling medium is cooled by using the vaporization heat of LNG.

The subject matters of claims 20 and 29 do not appear to involve an inventive step in view of document 1, document 3 cited in the ISR, and a well-known technique. Document 3 describes that, in an apparatus in which a component in a gas to be treated is condensed and solidified by placing the gas to be treated in direct contact with a cooling medium, the solidified component is separated by a solid-liquid separating apparatus.

The subject matters of claims 21-23 and 30-32 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

The subject matters of claims 46-53 do not appear to be novel or to involve an inventive step in view of document 4 cited in the ISR. It is recognized that document 4 describes a method and an apparatus for separating carbon dioxide, in which (1) gas containing carbon dioxide is distributed in a pressure-proof container having a cooler and an electric heater to cool and solidify said carbon dioxide, (2) said pressure-proof container is sealed by a control valve, (3) the temperature of said solidified carbon dioxide is increased to vaporize the carbon dioxide, (4) said carbon dioxide is liquefied due to a pressure increase inside said pressure-proof container caused by vaporization of said carbon dioxide, and (5) said liquefied carbon dioxide is discharged outside said pressure-proof container.

The subject matters of claims 37, 40, 44, and 45 do not appear to be novel or to involve an inventive step in view of documents 1 and 4. A person skilled in the art could have easily used the method and apparatus for removing carbon dioxide described in document 4 in order to remove carbon dioxide in the invention described in document 1.

The subject matters of claims 38, 39, 42, and 43 are neither described in any of the documents cited in the ISR nor obvious to a person skilled in the art.

The subject matter of claim 41 does not appear to involve an inventive step in view of documents 1, 3, and 4.

**WRITTEN OPINION OF THE
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Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

Claims 10-12, 14, 17, 18, 28, 30, 34, 35, 37-40, and 42 describe "a device for performing the process...", "a device for separating...", "a device for liquefying...", and the like. These descriptions are recognized to identify the device, which is a product, in terms of its function.

However, even in view of common technical knowledge at the time of filing, a person skilled in the art could not have assumed the technical scope of the device having the aforesaid functions. Furthermore, it is not recognized that the subject matters described in the specification cannot be adequately described without device identification in terms of the aforesaid functions.

Therefore, the description of the aforesaid claims is unclear.